Title	Parasitic Helminths from Dead Stranded Dugong, Dugong Dugon (Muller, 1976), in Dahican, Mati city, Mindanao, The Philippines
Author(s)	ANGSINCO-JIMENEZ, LEA; SATO, HIROSHI; PADILLA, ROY M.; SHERWIN EDGAR B. ATOY
Citation	PROCEEDINGS of the Design Symposium on Conservation of Ecosystem (2013) (The 12th SEASTAR2000 workshop) (2013): 65-70
Issue Date	2013-03
URL	http://dx.doi.org/10.14989/176187
Right	
Type	Conference Paper
Textversion	publisher

Parasitic Helminths from Dead Stranded Dugong, *Dugong Dugon* (Muller, 1976), in Dahican, Mati city, Mindanao, The Philippines

LEA ANGSINCO-JIMENEZ[1], HIROSHI SATO, DVM, PH.D[2],
ROY M. PADILLA, DVM[1] and SHERWIN EDGAR B. ATOY[1]
[1] *Davao Oriental State College of Science and Technology; 8200, Mati City, Philippines;*
Email: liyajim@yahoo.com/ljimenezph@yahoo.com
[2]*Laboratory of Parasitology, Joint Faculty of Veterinary Medicine, Yamaguchi University,*
1677-1 Yoshida, Yamaguchi 753-8515, Japan

ABSTRACT

Two dugongs, *Dugong dugon* (Muller, 1976), were accidentally entangled in fishing nets in Barangay Dahican, Mati City, Southeastern Mindanao, Philippines. These dugongs, 2.2 and 2.5m in length and 172 and 132.5kg in weight respectively, were necropsied in January and February 2011, and a parasitological examination was conducted on each. From one dugong, adult roundworms, *Paradujardinia halicoris* and trematodes, *Solenorchis travassosi* (syn. *Indosolenorchis hirudinaceus*) were recovered from the stomach or small intestine and caecum respectively. From the other, juvenile roundworms were found in the stomach and small intestine. Female adults were 104.7mm long and 3.1mm wide on average, whereas male adults were similarly 97.6mm long and 2.8mm wide. Scanning Electron Microscopy (SEM) of *P. halicoris* showed that this nematode had three well-defined lips, longer than the width, with small triangular interlabia between them, distinctly offset from the anterior end. A few trematodes, *S. travassosi*, were 10.3mm long and 3.1mm wide on average with a tiny oral sucker and a large posterior sucker subterminally located at both extremities. The posterior extremity has a distinct crescent-like muscular projection on its end. This is the first confirmed record of two helminth species from dugongs around Mindanao Island.

KEYWORDS: Dugong, *Dugong dugon,* Stranding, Parasitic helminths, Nematodes, Trematodes

INTRODUCTION

The *Dugong dugon* (Muller, 1976) locally known as "dugong" or "duyong", is a herbivorous marine mammal and the extant species in the family Dugongidae. The dugong has a large distribution range which includes subtropical and tropical countries like the Philippines. Along the southeastern part of Mindanao, particularly at Davao Oriental, numerous sightings of dugongs have occurred in the bay waters of Pujada, Mayo and the adjacent coastal waters, but no proper documentation and official records have been made. However, studies focusing on dugongs, specifically those examining their parasitic infections, are scarce because of the nature of the distribution of this mammal in the wild.

Dugongs as vegetarians are the grazers of seagrass meadows, in which their feeding habits also influence the health of the animals. It is speculated that infestations on the marine mammals are affected by the parasites involved, as intermediate and transport hosts through behavioral, ecological or biogeographic factors (Kinne, 1985; Sprent, 1981; Jueco, 1977). In Sirenians (the manatees and dugongs), they acquired unique ascaridoid species which are linked to the vegetation in the area or in other organisms associated with the animals (Sprent, 1981; Jueco, 1977). Ascaridoid nematodes, *Paradujardinia halicoris* found in the dugong stomach, were described and reported from the Red Sea, India, Japan, Australia and the Philippines. Measurements of *P. halicoris* from the Pacific Ocean (Queensland, Australia) and the Indian Ocean (Comoro Islands) were collected and compared (Sprent, 1981). All measurements when compared with the other *P.halicoris* specimens from the Comoro islands-Queensland and Japan-Philippines, appeared to have no identifiable differences and are identical.

In the Philippines, infestations of helminth parasites in dugongs were rarely reported in the 70's to 90's. The specimen from the Pacific coast off Luzon Island, Camarines Norte and Palawan is composed of one species of parasitic nematode, *Paradujardinia halicoris*, recovered from the stomach and intestines (Jueco, 1977; Sprent, 1980; Eduardo et al., 1998). Eduardo et al. (1998) also identified three species of trematodes, *Cochleotrema indicum*, *Taprobanella bicaudata*, *Lankatrema* sp. recovered from nasal passages and stomach and some cyst-like nodules of the stomach wall. The present study is the first to document dugong parasites in the sea off Southeastern Mindanao. A trematode species, *Solenorchis travassosi*(syn. *Indosolenorchis hirudinaceus*) was also recovered from the caecum and reported for the first time in dugongs around the Philippines.

MATERIALS AND METHODS

Two dead female dugongs, measuring 2.2 and 2.5m long and weighing 172 and 132.5kg respectively, were accidentally entangled in fishing nets in Barangay Dahican, Mati City, Philippines on January 26 and February 27, 2011. This locality is within Mayo Bay and it is bordered on the eastern side by the Pacific Ocean (Fig. 1). Necropsy was conducted for both dead dugongs.The worms were collected from the stomach, small intestine and caecum and preserved in 10% neutral-buffered formalin for further study. The specimens were examined in the Laboratory of Veterinary Parasitology at the Faculty of Agriculture, Yamaguchi University, Japan. Morphological observation was carried out using a stereomicroscope, usual light microscope and a scanning electron microscope (SEM; model JSM-6100, JEOL, Akishima, Tokyo, Japan). Photographs using the computer camera model (Handy Scope 130S; Science Eye, Saitama, Japan) were used to illustrate the details of the features of the specimen. The use of the Scanning Electron Microscope clearly revealed more accurate details of the morphological structures of the specimen (Gibbons, 1986). Measurement of worms was taken using photographs of specimens in calibrated Petri dishes. A digital curvimeter type S (Uchida-yoko, Chuoh-ku, Tokyo, Japan) was used when measuring the printed photos of parasites. After the measurements were recorded, computations of the actual size of the worms were completed using the established factor in the calibrated Petri dishes. One trematode specimen was immersed in water containing 5% acetic acid for softening, pressed between two glass slides and refixed using 70% alcohol. The specimen was stained with Semicon's calmine, dehydrated, cleared in xylene, and embedded in Eukitt® medium (O. Kinder GmbH & Co., Freiburg, Germany).

Identification of specimens was based on the taxonomic books of Yamaguti (1971), Sprent (1980) and other references including Jueco (1977), Lauckner (1985), Hasegawa (1988), Eduardo et al. (1998) and Jones (2005).

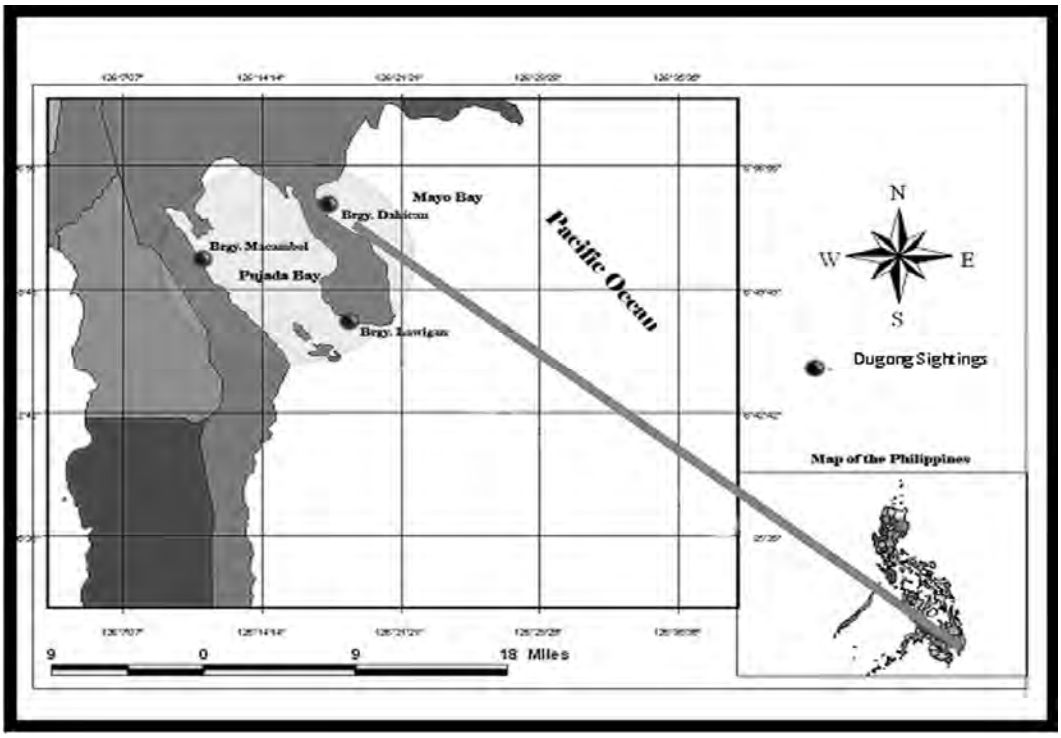

Fig. 1. Map showing the site of the dead stranded dugong in Brgy. Dahican, Mayo Bay, Mati City, Philippines

RESULTS

Two species of parasites were collected from the stomach, small intestine and caecum of the stranded dead dugong in Barangay Dahican, Mati City. Worms collected in the stomach and small intestine consisted of numerous adults (Dugong 1 collected on 27 Jan, 2011) and juveniles (Dugong 2 collected on 26 Feb, 2011) dugong roundworms, *Paradujardinia halicoris* (Owen, 1833) (Fig. 2*)*.This roundworm had three well-defined lips, longer than they are wide, with small triangular interlabia between them, distinctly offset from the anterior end (Fig. 3). The inner surface of the anterior lip margin lacked a dentigerous ridge and was smooth. The dorsal lip had two papillae and the sub ventral lips featured one papilla on the subventral side and an amphid on the

lateral side. There were no cervical alae. Male worms had two spicules with rounded tips and alae. There were four papillae in the precloacal region and two laterals to the cloaca. The female had a tapering tail with a conical tip. The vulva is located near the posterior end. Measurements of their parts are shown in Table 1.

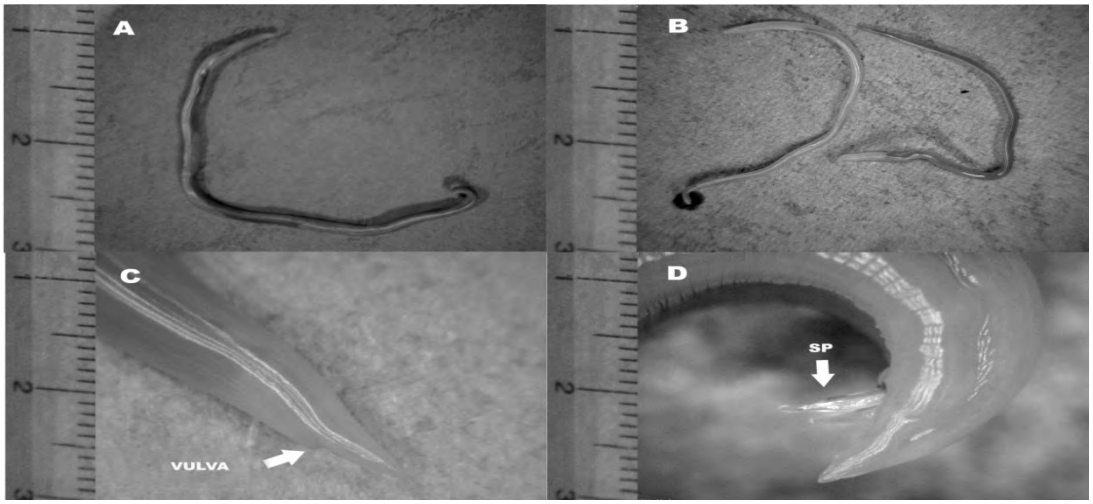

Fig. 2. A. Parasitic roundworms species (*Paradujardinia halicoris* (Owen, 1833); B. Juvenile *P. halicoris*; C. Female (vulva); D. Male (SP-spicule)

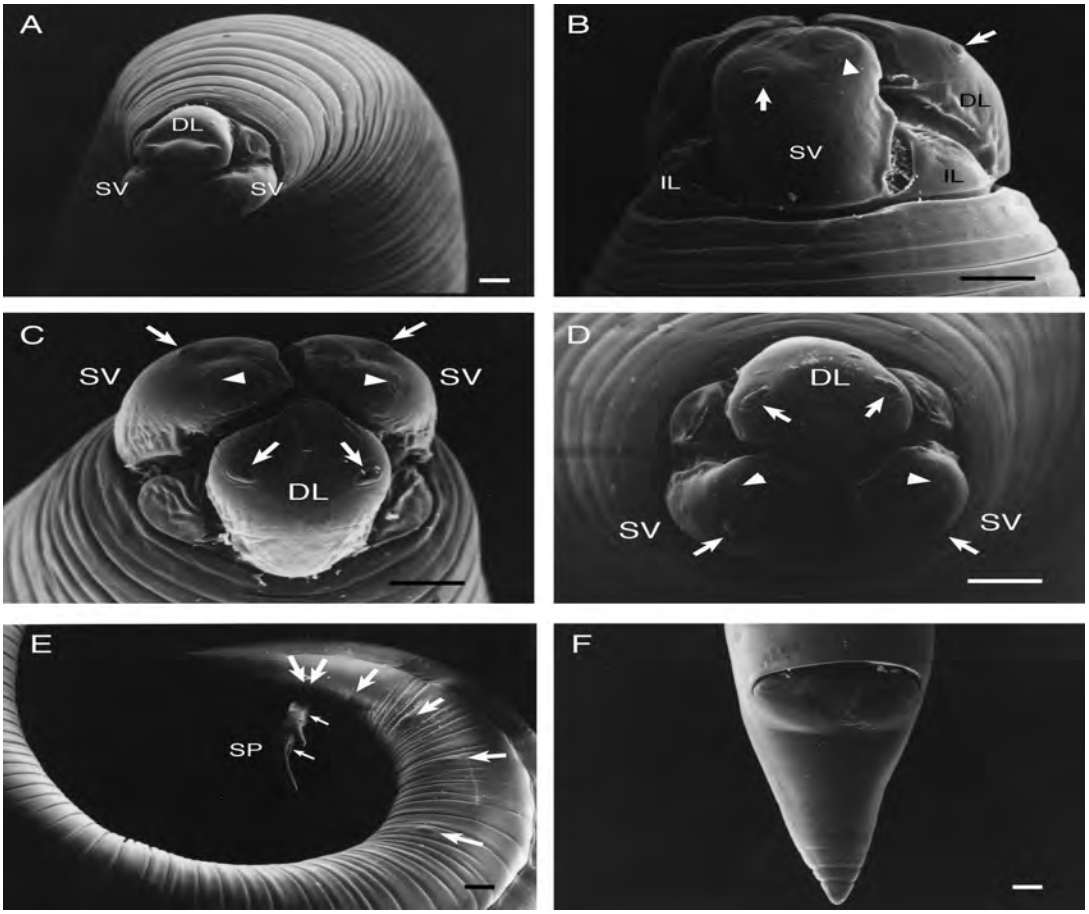

Fig. 3. Scanning Electron Microscopy (SEM) of adult *Paradujardinia halicoris*. A-D, anterior end of male and female worm at different views; E, posterior end of a male worm; F, posterior end of a female worm. Scale bar = 100 µm. Medium-sized arrows worm; indicate papillae and arrow heads indicate amphids, Small-sized arrows indicate lateral ala of the spicule. Abbreviation: DL, dorsal lip; IL, interlabia; SP, spicule; and SV, subventral lip;

Table 1. Measurements of nematode and trematode specimens collected from stranded, dead dugongs.

Date & Place of Collection	Parasitic Worms	Sex	Location on the host	BL (mm)	BW (mm)
Dugong1:Dahican 1/27/2011	**Nematode:** *P. halicoris*	M (2)	Stomach	85.4-109.9(97.6)	2.7- 2.8 (2.8)
		F (8)	Stomach	81.1-119.4(104.66)	2.86-3.55(3.11)
Dugong2:Dahican 2/26/2011		Juv.	Sm.Intestine	31.0-46.8 (38.8)	0.7- 1.7 (1.3)
	Trematode:				
	S.hirudinaceus		Caecum	8.2- 11.7(10.3)	2.5- 3.7(3.1)

A few trematodes, *Solenorchis travassosi* (syn. *Indosolenorchis hirudinaceus,* were collected from the caecum of Dugong 2 (Fig. 4). The worms, slightly concave ventrally and convex dorsally, had an average body length of 10.3mm and body width of 3.1mm. The worm had a small oral sucker sub terminally located at the anterior end and a large sub terminal acetabulum opening ventrally at the posterior end, with a distinct crescent-like muscular projection beyond the posterior sucker. Arrangement of the organs inside the worm was similar to the description made by Jones (2005).

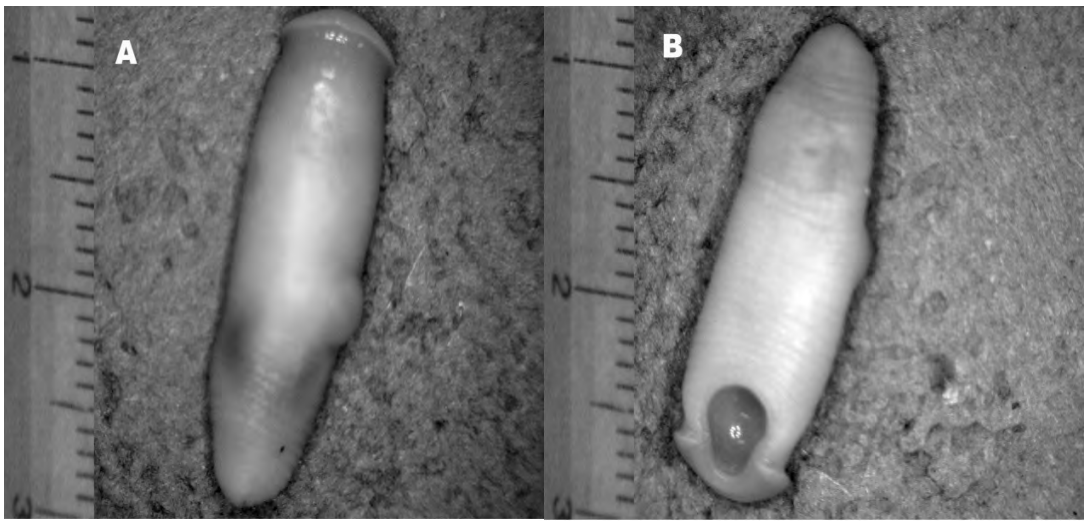

Fig.4. Parasitic trematodes species *Solenorchis travassosi* Hilmy, 1943 (syn. *Indosolenorchis hirudinaceus* Crusz, 1951 after Jones (2005). A. Dorsal view; B. Ventral view

DISCUSSION

Information pertaining to infestations and diseases of dugongs is scarce and occasional, due to the incidental availability of the specimen. Generally, the sources of specimens are taken from the necropsies of dead, stranded animals. The present study recorded the specimens *Paradujardinia halicoris* (Owen, 1833) and *Solenorchis travassosi* (syn. *Indosolenorchis hirudinaceus*) collected from the intestine and caecum of the dugong from the island of Mindanao. Puentespina (pers. comm., 2008) found the same species of *P. halicoris* and unidentified *Solenorchis* sp. from a stranded dugong collected from the neighboring coastal waters of Pujada Bay. In both cases, no heavy infestations of parasites were noted where the nematodes were collected. Other records of parasitic worms from Dugong *dugon* in the Philippines are rather limited (Table 2). The recorded sources of the specimens were the Pacific coast off Luzon Island, Sta. Elena, Camarines Norte and Palawan where one nematode species, *P. halicoris* and three trematode species, including *Opisthotrema dujonis, Monostomum dujonis* and *Opisthotrema cochleare* were identified (Jueco, 1977; Sprent, 1980; Eduardo et al., 1998).

Table 2. Distribution and occurrence of dugong parasites in the Philippines.

Specimen, Reference&Date Collected **Nematode:** *Paradujardinia halicoris*	**Location in the host**	**Locality**
Jueco, N.L.(1977)(June1977)	Stomach, small intestine	Camarines Norte, Luzon
Sprent, J.F.A., (1980)	Stomach, small intestine	Pacific Coast Off Luzon Island
Eduardo et al.,(1998)(Sept1993)	Stomach, small intestine	Palawan, Luzon
Puentespina (Unreported)(2008)(Jan2008)	Stomach, small intestine	Pujada Bay, Mindanao(Pers. Com.)
Present Study(Jan.&Feb2011)	Stomach, small intestine	Dahican, Mindanao
Trematode:		
1.*Cochleotrema indicum*	Nasal passages	Palawan, Luzon
2.*Taprobanella bicaudata*	Stomach	
3.*Lankatrema sp.*	Cyst-like nodules of stomach wall	
Reference: Eduardo et al.,(1998) (1998)		
4.*Solenorchis sp*	Caecum	Pujada Bay, Mindanao(Pers. Com.)
Reference:Puentespinaet.al.,.2008 (Unreported); (Jan2008)		
5.*Solenorchis travassosi* Hilmy, 1943 (syn. *Indosolenorchis hirudinaceus* Crusz, 1951 after Jones (2005)	Caecum	Dahican, Mindanao
Reference: Present Study(Feb.2011)		
Other reported Trematode species in the Philippines		
1.*Opisthotrema dujonis*	No data	No data
2.*Monostomum dujonis*, Leuckart, 1874		
3.*Opisthotrema cochleare*, Fischer, 1883		

There are relatively few reports on trematode infestations on dugong. They usually parasitize the intestinal tract of the dugong, specifically the pyloric caeca, as reported from the Red Sea and the Indian Ocean (Lauckner, 1985). The most common parasites, *Paradujardinia halicoris* is also reported from the Indo-Pacific and the Red Sea (Jueco, 1977; Lauckner, 1985). In Thailand, analyses of stomach contents were conducted in six stranded dugongs. The common nematodes *P.halicoris* were recovered with no signs of cellular reaction on the host tissue surrounding the nematodes (Adulyanukosol, 2001; Marsh et al., 1977). Out of the 6 stomachs of the dugong specimens, only 2 showed the presence of nematodes. The same species of nematodes were collected from the stomach and upper small intestine of a stranded dugong and the first record of *P. halicoris* was recorded in Okinawa-Jima, Japan (Hasegawa, 1988). Specimens of such nematodes from Queensland, Australia as well as in the Comoro Islands belong to the same species (Sprent, 1981). These parasitic nematodes adopt and harbor their range of distribution through their intermediate and transport hosts.

Parasites of an animal reflect the status of habitat and zoo geography. Generally, the more diverse species of parasites at a low density in organisms can be a good indicator of a healthy marine environment. It must be emphasized that, to collect biological information from dugongs, many participants with multiple disciplines are needed to collaborate, with limited opportunity to do so. More information on parasites from dead, stranded dugongs should be collected around the Philippines, which may contribute to the conservation of these marine animals which are extremely vulnerable to extinction (IUCN, 2007).

ACKNOWLEDGEMENT

The research visit of the first author (L.A.J.) to Japan for parasite identification was made possible in part through a grant of JENESYS Program (headed by Dr. M. Yamada, Faculty of Agriculture, Yamaguchi University) of the Japan Society of Promotion of Science. SEM techniques were supported by Dr. S. Tanaka, Faculty of Agriculture, Yamaguchi University. The invaluable assistance of graduate and undergraduate students from the Laboratory of Parasitology, Faculty of Agriculture, Yamaguchi University is deeply acknowledged. Special thanks to the office of Department and Environment and Natural Resources (DENR), the Municipal and Provincial Local Government Units (LGUs), Amihan Boys and volunteers, DOSCST President and administrative staff, colleagues from NMSD, the R&E office for all their support of this research work.

REFERENCES

Blair, D. (1981). The monostomes flukes (Digenea: Families Ophisthotrematidae Poche and Rhabdiopoeidae Poche) parasitic in sirenians (Mammalia: Sirenea).

Eduardo, S. I. Yaptinchay, A. A. P., Lim, T. M. S. (1998). Some helminth parasites of sea cow (*Dugong dugon*, Muller, 1976) (Mammalia: Sirenia) in the Philippines. *Philippines Journal of Veterinary Medicine 35*: 27-36.

Eros, C., Marsh, H., Bonde, R., O'Shea, T., Beck, C., Recchia, C., Dobbs, K., Turner, M., Lemm, S., Pears, R. and Bowater, R. (2007). *Procedures for the Salvage and Necropsy of the Dugong (Dugong dugon). 2nd Edition*. Great Barrier Reef Marine Park Authority Research Publication, Townsville, Queensland, Australia, 98 p.

Gibbons, L.M. (1986). SEM *Guide to the Morphology of Nematode Parasites of Vertebrates.* CABI Publishing, Slough, U.K., 199 p.

Hasegawa, H. (1988). *Paradujardinia halicoris* (Owen, 1833) (Nematoda: Ascarididae) collected from a dugong, *Dugong dugon* of Okinawa, Japan. *Biology Magazine, Okinawa 26*: 23-25 (in Japanese with English summary).

Jones, A. (2005). *Family Cladorchiidae Fischoeder, 1901*. CABI Publishing, Slough, U.K. p.257-317.

Jueco, N. L. (1977). The Nematode *Paradujardinia halicoris* in the sea cow in the Philippines. Kalikasan, *Philippine Journal of Biology 6*: 257-262

Lauckner, G. (1985). Diseases of Mammalia: Sirenia. *In: Diseases of Marine Animals, Volume IV, Part 2*, O. Kinne (Ed.), Biologische Anstalt Helgoland, Hamburg, Germany, p. 795-803.

Sprent, J.F.S. (1981). Ascaridoid nematodes of Sirenians -the Heterocheiliinae redefined. *Journal of Helminthology. 54*: 309-327.

Yamaguti, S. (1971). *Synopsis of Digenetic Trematodes of Vertebrates*. Keigaku Publishing Co. Ltd. Tokyo, Japan, 1074 p.